

PSYCHE.

COLLEMBOLA OF THE GRAVE.

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This article deals with the Collembola collected from graves in Washington, D. C., by Dr. Murray Galt Motter and recorded in his important paper* on the fauna of the grave.

I am indebted to Dr. Motter and Dr. Howard for the opportunity to examine this material.

In over fifty-six hundred specimens there were only six species, five of which are new. Ninety-seven per cent consisted of *Isotoma sepulcralis*, sp. nov., two per cent of *Entomobrya lucifuga*, n. sp. and the four other species were represented by only thirty-three examples in all.

The comparison of my results with those tabulated by Dr. Motter shows that, as regards the period of interment, Collembola (usually *I. sepulcralis*) occurred with practically every cadaver from No. 1 (1 yr. 11 mos.) to No. 81

(16 yrs. 5 mos.), and one specimen was found with No. 95 (21 yrs.). In fact, Collembola occurred almost always when the surroundings were in any degree moist, and almost never in a dry environment; in the two cases (Nos. 14 and 95) in which they were present in spite of dryness, there were only three individuals altogether. Nos. 82-100 were all marked as "dry" and none of them afforded any collembolans except No. 95, just mentioned. From these insects, then, no conclusion of any medico-legal importance appeared,—simply a few facts of entomological interest.

The most striking characteristics of these subterranean forms are those that may be attributed to the absence of light: all are white—without pigment—and are blind, with the exception of two species, which, of course, have a black ocular pigment. In one of these, the eyes even vary slightly in number. All these species have the chief peculiarities of cave insects. The blind *Isotoma fimetaria* is known, the world over,

* M. G. Motter. A contribution to the study of the fauna of the grave. A study of one hundred and fifty disinterments, with some additional experimental observations. Journ. N. Y. Ent. Soc., vol. 6 (1898), pp. 201-231.

as a soil insect and several blind species of *Sinella* and *Pseudosinella*, especially the latter, have been found in Europe and America, confined to caves or living under stones and in other dark places. The two species here described as having eyes are doubtless not restricted to dark situations.

For each species I give the numbers used by Dr. Motter to designate particular specimens in the Stiles-Motter collection of grave fauna, deposited in the U. S. National Museum. Each of these numbers is followed by another in parentheses that expresses an approximate estimate of the number of individuals.

No. 46 I did not have, and I did have some that do not appear in the table already referred to. These are Nos. 51 (5 individuals), 105 (3), 112 (7), 123 (9), 143 (2), 151 (2), 153 (15), 156 (3), 178 (6), 187 (500), 223 (15), 399 (1), 408 (50), 414 (2).

Isotoma fimetaria (L.) Tull.

1761. *Podura fimetaria* Linnaeus, Fauna Svecica, ed. 2.

1872. *Isotoma fimetaria* Tullberg, Sveriges Podurider, p. 48, taf. 9, figs. 32-33.

Figures 1-2.

White. Eyes absent. Postantennal organs ovate or oval. Antennae slightly longer than the head, with segments as 6: 9: 9: 17; first two segments cylindrical, third dilated apically, fourth elliptico-cylindrical. Superior claws (fig. 1) smoothly tapering,

scarcely curving, untoothed; inferior claws half as long, lanceolate, acuminate; hind claws largest; one unknobbed tenent hair. Abdomen feebly dilated with third and fourth segments subequal. Furcula as long as the head, borne by the antepenultimate segment and not attaining the ventral tube (extending two thirds as far); dentes two and one half times the manubrium in length, slender, tapering; mucrones (fig. 2) elongate, subequally bidentate; apical tooth scarcely hooked, second erect; proximal two thirds of mucro suboblong. Numerous stiff setae on head, body, and appendages; several long erect setae in a row across the middle of each abdominal segment; many long stiff setae at the apex of the abdomen. Length, .87 mm.

This is one of the best known species of its order and is a cosmopolitan insect. It is essentially a soil species, often occurring about the roots of plants.

Five specimens: 153 (3), 151 (2).

Isotoma sepulcralis, sp. nov.

Figures 3-8.

White. Eyes (fig. 3) normally ten, sometimes eight. Postantennal organs broadly elliptical, oval or ovate. Antennae subequal to the head in length; segments stout, as 6: 10: 9: 19; third segment dilating distally, fourth elliptico-cylindrical. Body elongate cylindrical. Superior claws (fig. 4) uniformly curving and tapering, untoothed; inferior claws extending two thirds as far, ovate-lanceolate, acuminate, with stout midrib; front claws smallest, the other pairs successively larger; tenent hairs absent. Fourth abdominal segment one third longer than the preceding one and bearing the furcula. Furcula short, extending but half way to the ventral tube, strongly tapering; manubrium and dentes subequal in length; mucrones (fig. 5) one third as long as dentes, elongate, sub-

equally tridentate; apical tooth sharp, feebly hooked or, rarely, falcate; second conical, erect; third a trifle smaller than second, erect or else slightly inclined caudad, situated midway on the mucro and laterad of the other teeth. The mucrones vary considerably in minor details as shown in figures 6-8; in one case, the third tooth was absent on the left mucro but present on the right one, and in a single instance the proximal tooth was doubled on both mucrones (fig. 8). Clothing of numerous short appressed setae, which are restricted to the middle half of each segment, leaving the anterior and posterior fourths of the segment bare; longer, stiff setae at the apex of the abdomen; short stiff bristles on antennae and legs; short curving setae on the urcula with a few long erect ones. Maximum length, 1.8 mm.

This species is quite distinct from any hitherto described. It formed ninety-seven per cent of all the specimens examined.

Over 5400 types: 2 (600), 4 (45), 12 (15), 13 (33), 14 (200), 15 (100), 75 (1), 100 (300), 101 (79), 164 (5), 182 (75), 184 (100), 186 (200), 187 (500), 188 (8), 193 (150), 195 (24), 201 (20), 204 (1), 223 (15), 231 (60), 243 (17), 245 (14), 248 (1), 259 (50), 270 (200), 308 (1), 324 (21), 331 (1), 332 (100), 347 (8), 356 (4), 357 (25), 362 (300), 380 (4), 383 (1), 390 (50), 394 (2000), 407 (70), 408 (50), 422 (1), 429 (86). Type No. 6144, U. S. National Museum.

• *Entomobrya lucifuga*, sp. nov.

Figures 9-10.

White. Eyes absent. Antennae twice as long as the head, or more than half as long

as the body, with cylindrical segments, related as 11: 16: 18: 26. Mesonotum concealing the pronotum. Superior claws (fig. 9) broad, curving, with a pair of large triangular basal lamellae and beyond these an obsolete tooth; inferior claws extending three fourths as far, lanceolate, acute with sinuate outer margin; hind claws largest; one short tenent hair with a small knob. Abdomen dilated; fourth segment four times as long as the third. Furcula attaining the ventral tube; dentes half as long again as the manubrium; mucrones (fig. 10) long, falcate, the second tooth equidistant from base and apex and the basal spine strong; two barbellate dental setae attain the apex of the mucro and a third one exceeds it considerably. Stout clavate barbellate setae are found on the first two antennal segments and the coxae, are profuse on the head, meso- and metanotum, and occur, constantly diminishing in number, on the middle of each succeeding segment. Simple barbellate setae occur densely on the appendages and the apex of the abdomen; the furcula bears many suberect clavate barbellate setae. Maximum length, 1.7 mm.

One hundred and thirty-one types: 7 (30), 8 (2), 9 (11), 10 (3), 17 (1), 18 (6), 105 (3), 112 (7), 123 (9), 143 (2), 151 (1), 153 (12), 156 (2), 178 (4), 219 (12), 229 (1), 237b (2), 288 (1), 331 (4), 356 (3), 358 (4), 363 (2), 366 (5), 383 (1), 399 (1), 414 (1), 422 (1). Type No. 6145, U. S. National Museum.

Sinella tenebricosa, sp. nov.

Figures 11-14.

White. Eyes absent. Antennae (fig. 11) half as long again as the head, with segments as 3: 6: 5: 11; third segment subclavate, fourth elliptical. Prothorax exposed. Superior claws (fig. 12) broad, almost straight, with a long tooth in the middle and a long subtriangular acuminate basal lamella; front

pair of superior claws two thirds as long as the others; inferior claws three fifths the length of the superiors on the front feet and three fourths on the others, straight, broadly linear, acute, with a large ovate acuminate lamella on the basal half of the outer margin; one unknobbed tenent hair. Abdomen dilated; fourth segment two and one half times the third in length. Furcula attaining the ventral tube; dentes a little longer than manubrium; mucrones (fig. 13) simple, falcate, with a long curving basal spine that attains the apex of the mucro. Sparse short curving bristles on head and body; many stiff barbellate setae on the appendages; a few erect barbellate setae on the first two antennal segments and on the legs; stout clavate barbellate setae (fig. 14) occur on the vertex, coxae, meso- and metanotum and the last three abdominal segments. Length, .9 mm.

S. tenebricosa is closely allied to the European *S. höfti* Schäf.,* from which it differs chiefly in the claws.

Twenty-four types: 10 (15), 51 (5), 178 (2), 229 (1), 383 (1). Type No. 6146, U. S. National Museum.

Pseudosinella argentea, sp. nov.

Figures 15-16.

White. Eyes absent. Antennae one and one half times as long as the head and half the length of the body, with segments related as 5: 10: 11: 17; third segment clavate, fourth elliptico-cylindrical. Thorax arched; mesonotum almost as long as the head and concealing the pronotum. Superior claws (fig. 15) stout, apically curving, unequally tridentate, the two proximal teeth being side by side; inferior claws two thirds as long on hind

pair, and half as long on the other feet, broadly linear, acute; tenent hair small, unknobbed. Abdomen moderately dilated; fourth segment three times as long as the third. Furcula extending beyond the ventral tube; manubrium and dentes subequal in length; mucrones (fig. 16) basally suboblong with two subequal teeth and a long basal spine that attains the apex of the proximal tooth. Large rounded scales on head, body, and the under side of the furcula; dense stiff setae on antennae and legs; a dense cluster of stout rigid setae on the anterior border of the mesonotum and a few such setae above the antennae; dense short curving feathered setae occur at the apex of the abdomen and on the upper surface of the furcula. Length, 1.25 mm.

This new species differs as to claws and mucrones from *P. cavernarum* Moniez* (*Tullbergia immaculata* Lie-P. †) and *P. virei* Abs., ‡ its nearest allies.

A unique type, No. 156. Type No. 6147, U. S. National Museum.

Pseudosinella candida, sp. nov.

Figures 17-19.

White. Eyes (fig. 17) sixteen; a black interocular V-shaped mark sometimes occurs. Antennae one and one fourth times as long as the head, with segments as 6: 10: 10: 22; basal ring one fourth as long as the first seg-

* R. Moniez. Espèces nouvelles de Thysanores trouvées dans la grotte de Dargilan. Rev. biol. nord France, t. 6 (1893), pp. 81-86. See pp. 84-85.

† O. J. Lie-Petersen. Norges Collembola. Bergens mus. Aarb. 1896, no. 8, 24 pp., 2 pls. See pp. 15-16, pl. 2, figs. 1-4.

‡ K. Absolon. Uebereinige theils neue Collembolen aus den Höhlen Frankreichs und des südlichen Karstes. Zool. Anz., bd. 24 (1901), pp. 82-90, 10 figs. See pp. 87-88, figs. 6-8.

* C. Schaffer. Die Collembola der Umgebung von Hamburg und benachbarter Gebiete. Mith. Naturh. Mus. Hamburg, bd. 13 (1896), pp. 147-216, taf. 1-4. See pp. 192-193; taf. 4, figs. 103-105.

ment; second segment subclavate, third clavate, fourth elliptico-cylindrical. Mesonotum concealing the pronotum. Superior claws (fig. 18) broad, curving, with a large proximal tooth and a small sharp distal tooth; between these there is, on the hind feet, another minute tooth; inferior claws over half as long as the superiors, oblong-lanceolate; tenent hair small and unknobbed. Fourth abdominal segment nearly four times as long as the third. Furcula attaining the ventral tube; manubrium and dentes subequal; mucrones (fig. 19) subfalcate with two subequal teeth and a prominent basal spine; three barbellate setae surround the mucro and two of them extend far beyond it. Scales large and rounded. A few minute setae occur

on the head, stiff bristles on the appendages and curving feathered setae on the dorsal side of the furcula. Length, 1 mm.

This species bears much resemblance to *P. alba* Pack.* In *alba*, however, the proximal tooth of the superior claw is more basal than in *candida*, while the fourth abdominal segment is only three times as long as the third, and dense clavate setae are present on mesonotum, coxae, and the apex of the abdomen; *alba*, moreover, has only four eyes.

Three types: 268 (2), 308 (1). Type No. 6148, U. S. National Museum.

FURTHER NOTES ON NEW ENGLAND FORMICIDÆ.

BY GEO. B. KING, LAWRENCE, MASS.

Last summer Mr. C. Abbott Davis of Providence, Rhode Island, collected with other insects, such species of ants as he found, and later turned them over to me for study. The following is a list of the species taken with localities. The first fifteen are from Rhode Island.

<i>Tapinoma sessile</i> Say.	Providence
<i>Formica fusca</i> L.	Lonsdale
<i>Formica fusca</i> var. <i>subsericea</i> Say.	Providence
<i>Formica rufa</i> subsp. <i>integra</i> Nyl.	Providence & Kingston
<i>Formica pallidefulva</i> Latr. subsp. <i>schau-fussi</i> Mayr.	Providence
<i>Formica lasioides</i> Em.	Providence
<i>Formica gagates</i> Latr.	Providence
<i>Camponotus herculeanus</i> Latr. subsp. <i>ligniperdus</i> Latr.	Providence
<i>Camponotus marginatus</i> Latr. var. <i>nearc-</i>	

<i>ticus</i> Em.	Providence
<i>Lasius americanus</i> Em.	Providence
<i>Lasius claviger</i> Rog.	Providence
<i>Cremastogaster lineolata</i> Say.	Lonsdale
<i>Myrmica rubra</i> Buck. var. <i>schencki</i> Em.	Providence
<i>Myrmica rubra</i> Buck. subsp. <i>scabrinodis</i> Nyl.	Kingston
<i>Monomorium minutum</i> Mayr. var. <i>minimum</i> Buckl.	Providence.
Three species taken in Vermont.	
<i>Aphacogaster fulva</i> Rog.	Bay, Vermont
<i>Leptothorax canadense</i>	Prov. Western Vt.
<i>Camponotus maculatus</i> Fabr. subsp. <i>vici-nus</i> Mayr.	Bay, Vt., and the follow-ing at Lynn, Mass.

* See C. Schäffer. Ueber württembergische Collembola, Jahres. ver. vaterl. Naturk. Württemberg, bd. 56 (1900) pp. 245-280, taf. 6. See pp. 267-270.